Commodore

NETWORKING DIVISION

Token-Ring
Network
System Connectivity

Multistation
Access Unit

Guide
To
Operations

MULTISTATION ACCESS UNIT

GUIDE TO OPERATIONS

COMMODORE TOKEN-RING NETWORK
MULTISTATION ACCESS UNIT
NOL2127

Commodore
NETWORKING DIVISION

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PREFACE

This guide is intended for the systems operator responsible for installing and maintaining the Token-Ring Network and any user who wishes to install and operate the Multistation Access Unit.

It describes the physical attributes of the Multistation Access Unit, its placement in the IBM Cabling System, the physical installation of the Multistation Access Unit and preventive maintenance needed to ensure trouble-free operation.

It is beyond the scope of this guide to discuss the general planning and layout of a Token-Ring Network cabling system. For guidelines to planning and implementing a Token-Ring Network around the IBM Cabling System, please refer to the IBM litterature below.

RELATED PUBLICATIONS

Using the IBM Cabling System with Communication Products, IBM order number GA27-3620-1.

IBM Token-Ring Network Introduction and Planning Guide, IBM order number GA27-3677-0.

IBM Token-Ring Network Problem Determination Guide, IBM order number SY27-0280-1.

HOW TO USE THIS GUIDE

Chapter 1 describes the functions of the Multistation Access Unit and its placing in the IBM Cabling System. Read this chapter to get an idea of the place of the Multistation Access Units and its function in the overall Token-Ring Network structure.

Chapter 2 explains preparation of the Multistation Access Unit for operation, mainly with respect to checking the package contents, activating the battery, and resetting the Multistation Access Unit in case of network interruptions.

Chapter 3 describes the installation of the Multistation Access Unit and the possible configurations. If you do not already have a complete, overall plan for the cabling at your premises, you may want to read this chapter before you decide on either a centrally located, a rack-mounted solution or a geographically distributed solution.

Chapter 4 briefly discusses numbering and labelling conventions used with the Multistation Access Unit.

Chapter 5 explains how to test the Multistation Access Unit using the reset/test function and the IBM 8228 Setup Aid. It also explains how to test the cable connections.

Chapter 6 contains a simple fault determination with SYMPTOM, CAUSE and ACTION entries.

FCC COMPLIANCE

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the instructions provided with the equipment, may cause interference to radio and TV reception. The equipment has been type tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or TV reception, which can be determined by turning the installed equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

1. Reorient the receiving radio or TV antenna where this may be done safely.

2. To the extent possible, relocate the radio, TV or other receiver away from the equipment.

If necessary, you should consult the place of purchase or an experienced radio/television technician for additional suggestions. You may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.
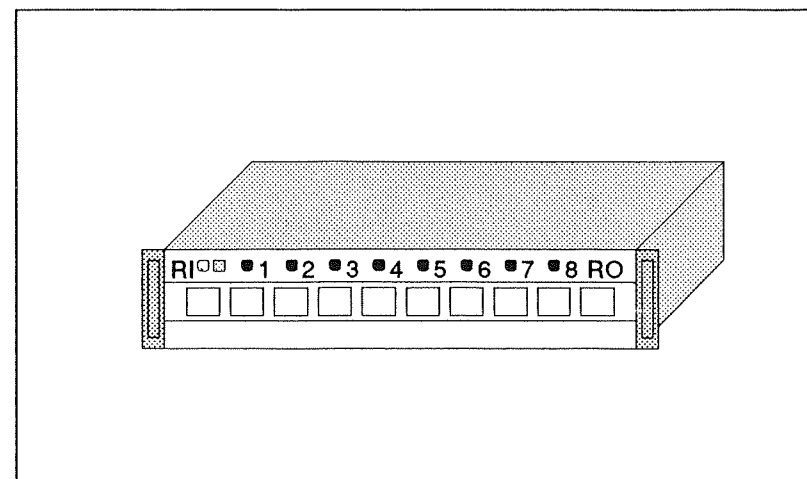
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1. INTRODUCTION

1.1   FUNCTIONAL DESCRIPTION

The Multistation Access Unit is an eight-station wiring concentrator used in connection with the IBM Cabling System and the Token-Ring Network.

The unit lets up to eight attached devices gain access to a Token-Ring Network. Each attached device may be a PC, a file server, a disk server, a printer, a communications gateway, or a remote bridge station.

Unlike any other Multistation Access Unit, a special reset/test feature, used in the event of a Token-Ring Network disruption, enables you to reset the eight relay switches without having to disconnect the attached devices.
The reset button also activates a number of LED indicators built into the front panel. The LEDs are part of a self-testing system which indicates the battery condition, checks the circuits for each of the eight station connectors, and shows the attachment status for each of the attached devices during normal operation.

No power supply is required for normal operation. However, a standard 9 volt battery, type 6LR61, is required to support the reset feature.

A single Multistation Access Unit may form a star-wired network as shown in figure 1.1 or be daisy-chained with other Multistation Access Units to form a larger network using the RING-IN (RI) and RING-OUT (RO) connectors as shown in figure 1.2.
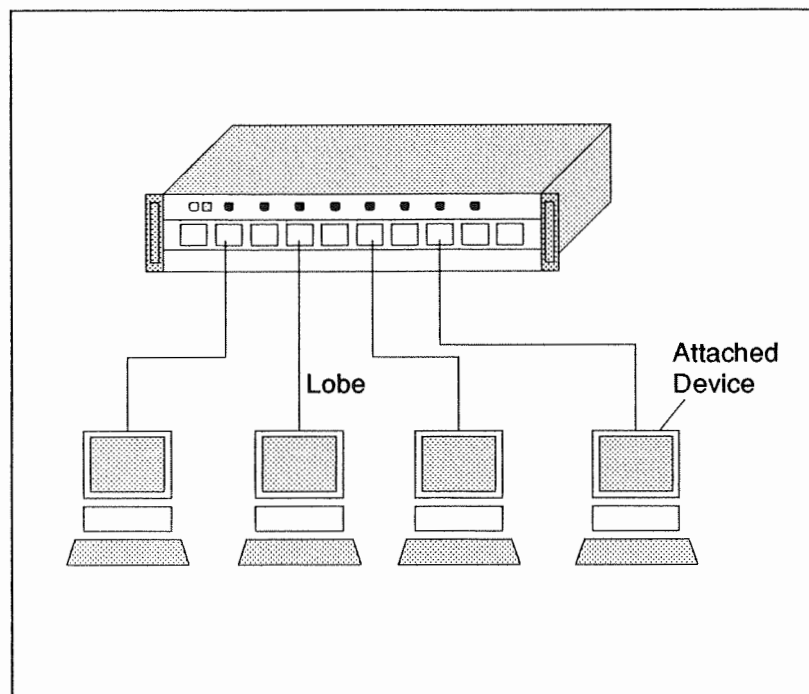
Fig 1.1 Multistation Access Unit in a star-wired network
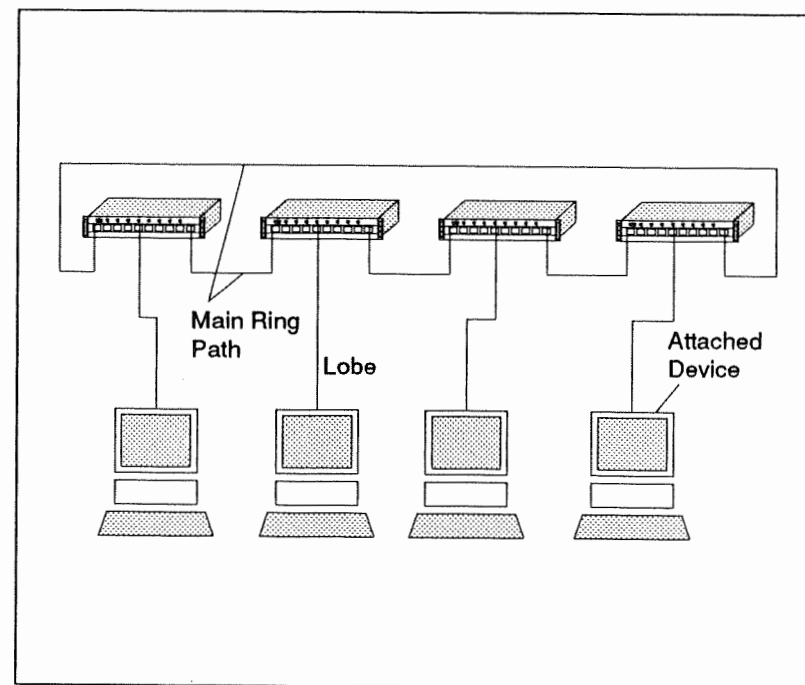
Fig 1.2 Daisy-chained Multistation Access Units

1.2 STAR-WIRED RING NETWORKS

In a star-wired ring network the devices are physically connected to the network in a star shape with each attached device as a point in the star. In a Token-Ring Network the Multistation Access Unit ensures that devices can be detached without breaking the logical ring of the network.

Each attachment point has a lobe which consists of two pairs of twisted wire (four seperate wires) going from the station connector to the attached unit. The station connectors of the Multistation Access Unit act like relay switches, opening or closing the lobe to a device, depending on whether or not the attached device is active on the network. If an attached device is not active, the Multistation Access Unit will automatically bypass it. See figure 1.3.

Fig 1.3 *Star-wired ring around a Multistation Access Unit*

2. PREPARING FOR OPERATION

2.1 PARTS REQUIRED

Ensure that the following parts are contained in the Multistation Access Unit shipment before proceeding with the installation procedure:

* The Multistation Access Unit itself

* This Guide To Operations

2.2 ACTIVATING THE BATTERY

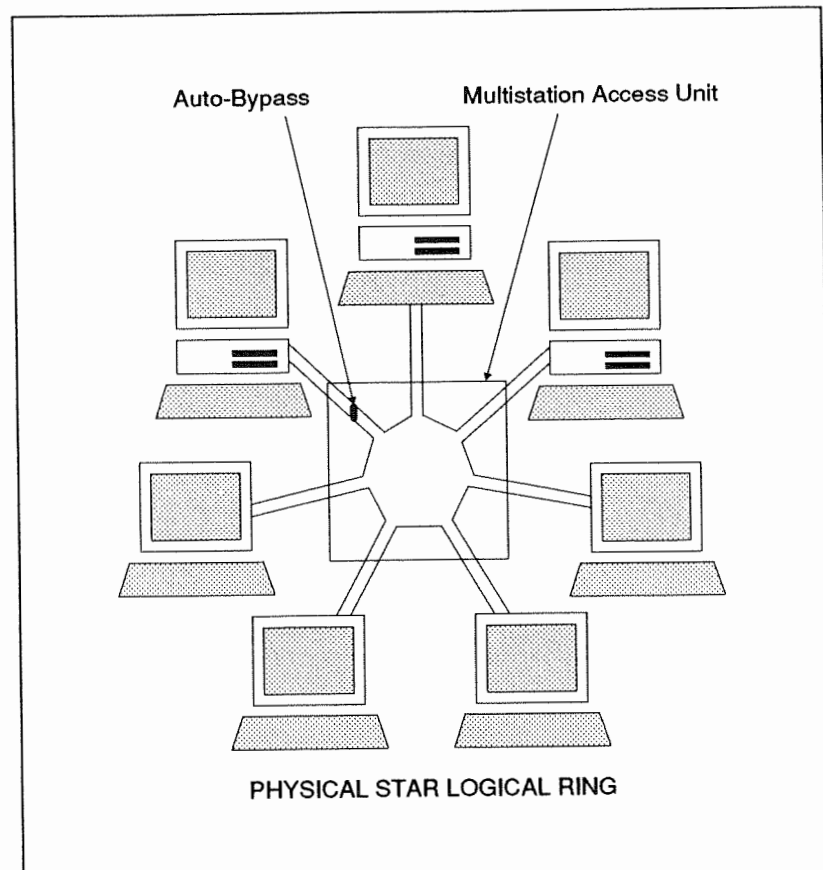At the time of shipment, the battery powering the Multistation Access Unit reset function was disconnected to avoid accidental drain of the battery. To enable the reset function you must remove the insulating plastic cap and connect the battery as follows:

1. Remove the battery housing on the rear panel by lifting the black housing and then withdraw ("BATTERY - LIFT TO WITHDRAW").

2. Take out the 9 volt battery and pull off the insulating plastic cap.

3. Reinsert the battery in the plastic casing, making sure that the poles correspond to the markings in the housing. See figure 2.1.

4. Position the battery casing in the slot and press gently into place; **DO NOT** use force. The battery housing clicks when it enters its locked position.

Note down the date of battery activation. After approximately 4 years the battery should be replaced to ensure continued maximum performance of the reset feature. The standard 9 volt alkaline battery, type 6LR61, can be bought from any of your usual suppliers.
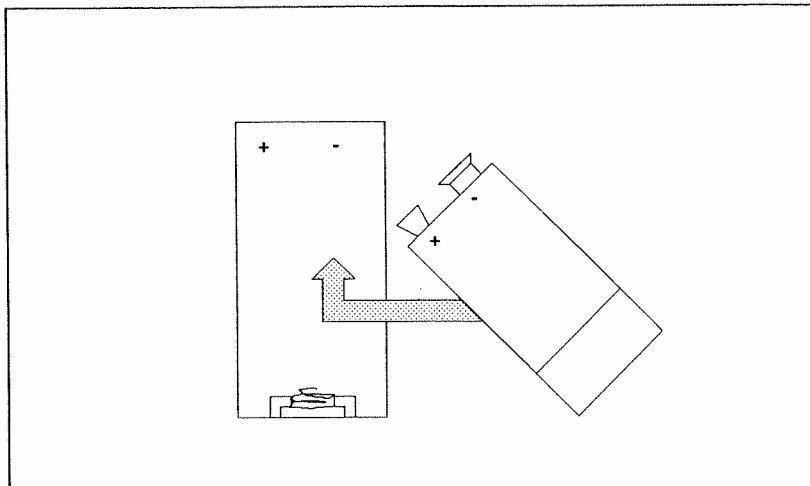
Fig 2.1 Inserting the battery

2.3 RESETTING

To ensure proper operation of the Multistation Access Unit after shipment, reset the unit as follows:

1. Press the RESET button (button indicated with an arrow in figure 2.2) and check that:

    A: The yellow LED to the left of the reset button lights up to indicate that the battery is properly charged. The light turns off when the reset button is no longer depressed.

    B: The red LEDs above the eight station connectors increase in intensity twice before turning off.

The Multistation Access Unit may be reset during normal operating conditions without disrupting the traffic on the Token-Ring Network. If any external disruption occurs, the Multistation Access Unit should be reset, which can be done without removing the connections to the attached devices.

When you reset the Multistation Access Unit with an active device attached to a station connector, the red LED above the active station connector will increase in intensity for three seconds and turn off to indicate the end of the reset cycle. Then it will again increase in intensity for three seconds and stay on to indicate active status for the attached device.

NOTE: If you reset the Multistation Access Unit while the attached devices are active on the Token-Ring Network, the attached devices will be disconnected for a period of approximately seven seconds.
However, the Token-Ring Network user will not be affected, as data is retransmitted and no loss occurs.
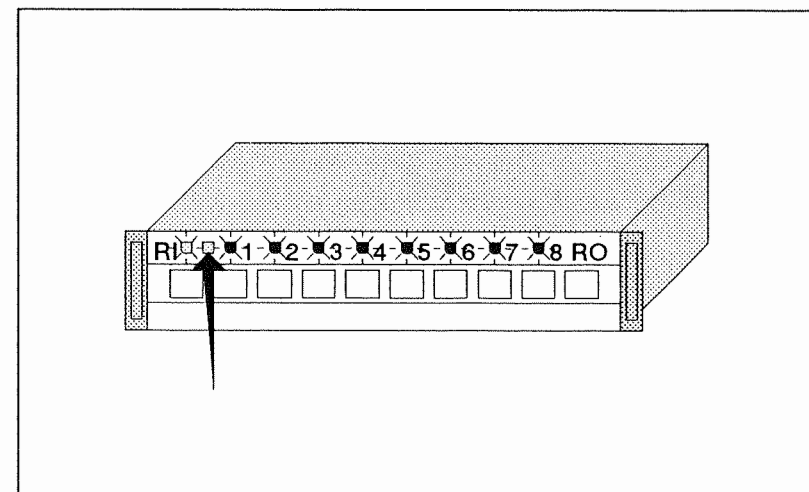

Fig 2.2 Resetting the Multistation Access Unit

3. INSTALLATION

3.1 INSTALLATION OPTIONS

The Multistation Access Unit can be installed in a number of ways depending on your need to move attached devices and on the cabling configuration at your premises. The following outlines the typical installation options:

- A single Multistation Access Unit placed in the same geographical location as the attached units. The Multistation Access Unit may then be housed in a wall-mounted casing.

- Several Multistation Access Units placed in the same geographical location as the attached units. The Multistation Access Units are daisy-chained by cables between the RING-IN (RI) and RING-OUT (RO) connectors.

- A single Multistation Access Unit in a wiring closet, connected by patch cables to the permanent building wiring distribution panel.

- Several Multistation Access Units in a wiring closet, daisy-chained via the RING-OUT and RING-IN connectors to form a larger network. They are then connected to the permanent building wiring with patch cables. Several racks may be interconnected for larger installations.

3.1.1 Attaching devices

Each Multistation Access Unit may serve up to eight attached devices. The devices may freely be attached or detached, activated or de-activated without any disruptions to the network traffic.

Attach a device to a Multistation Access Unit as follows:

1.   Prepare the Multistation Access Unit as outlined in chapter 2, PREPARING FOR OPERATION.

NOTE: When installing the Multistation Access Unit for the first time, it is important that you remember to RESET the unit as relay settings may have been altered during transport.

2. Make sure that the device to be attached is TURNED OFF and DISCONNECTED.

3. Check that the lobe cabling going from the Multistation Access Unit to your attached device is the correct type. The cable must have a MIC connector at one end to fit into the Multistation Access Unit station connector. Refer also to IBM cabling literature for device connectors.

4. Insert the MIC plug in any of the free station connectors on the Multistation Access Unit. The Station connectors are numbered 1 through 8.

5. Connect the other end of the cable to the device.

Continue to connect all the required devices as outlined above. When completed, check the connection and operation of the Multistation Access Unit as outlined in section 2.3, RESETTING.

The station connectors and the lobe connectors should be labelled for permanent installations. See chapter 4, LABELLING.

3.1.2 Single Multistation Access Unit

To build a Token-Ring Network in a single room or a small, geographically confined area, you simply attach up to eight devices to the Multistation Access Unit as outlined in figure 3.1.
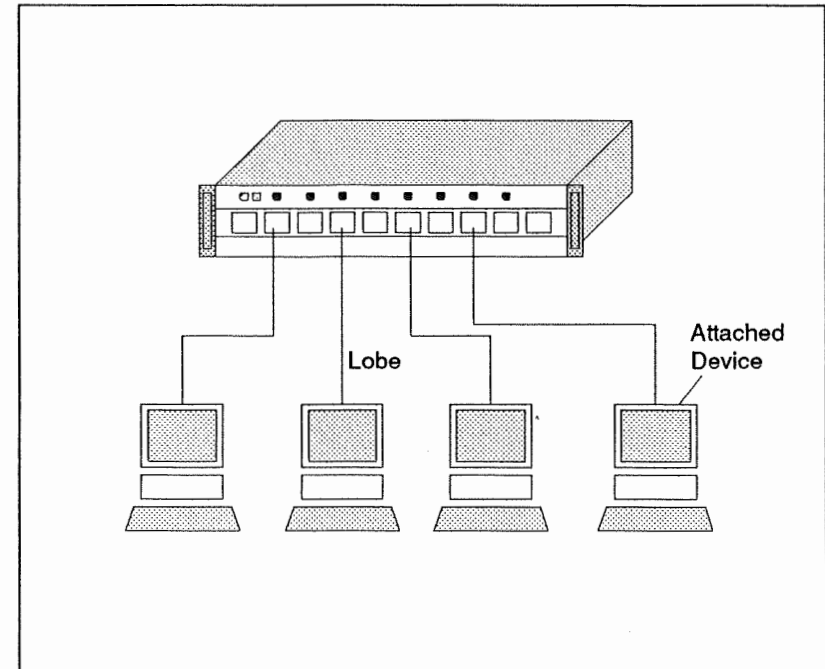
Fig. 3.1 Free-standing Multistation Access Unit

The Multistation Access Unit may be housed in a wall-mounted casing for installations of a more permanent nature. See figure 3.2.
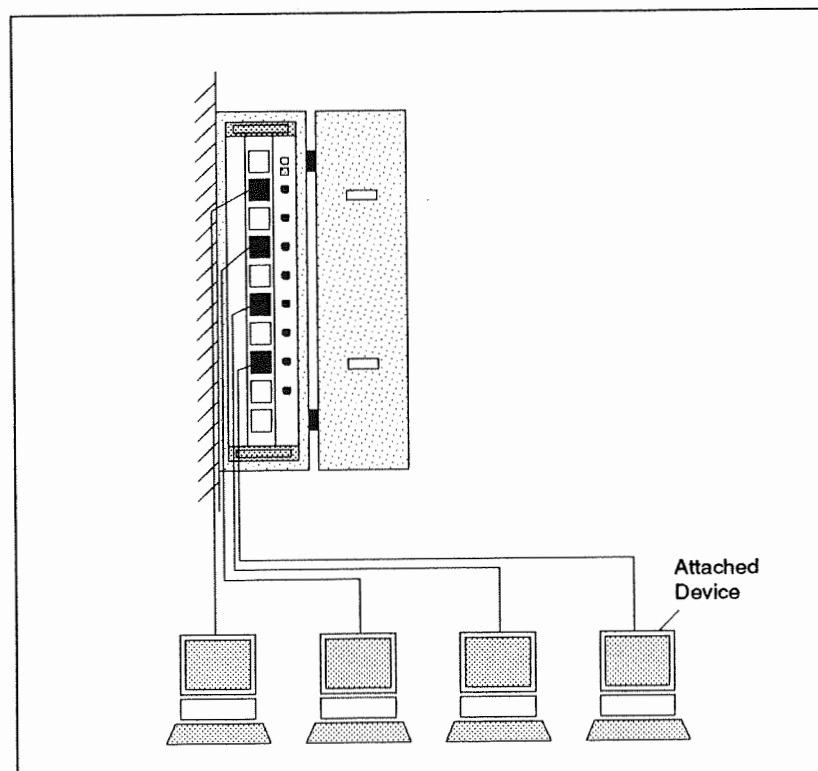

Fig 3.2 Wall-mounted Multistation Access Unit

3.1.3 Several Multistation Access Units

In order to form a larger Token-Ring Network covering a number of rooms or a medium-sized local area, several Multistation Access Units may be daisy-chained using the RING-OUT and RING-IN connectors.

A patch cable with an MIC connector at each end is used to interconnect the Multistation Access Units.

Prepare each Multistation Access Unit as outlined under chapter 2, PREPARING FOR OPERATION. Connect patch cables between the RING-OUT (RO) connector on one Multistation Access Unit and the RING-IN (RI) connector on the next Multistation Access Unit until you have a closed ring as shown in figure 3.3.

The individual Multistation Access Units may be housed in a wall-mounted casing for installations of a more permanent nature.

NOTE: It is **NOT** recommended to let the main Token-Ring Network path, which equals the sum of the patch cables interconnecting the Multistation Access Units, exceed 120 meters (400 feet). See the IBM Token-Ring Network Introduction and Planning Guide for details on cabling specifications.

NOTE: If an existing Token-Ring Network is to be expanded by installing an additional Multistation Access Unit, make sure that there are no active devices connected to the network. Check that the red LEDs are off. If not, the network and all active devices will be disrupted.
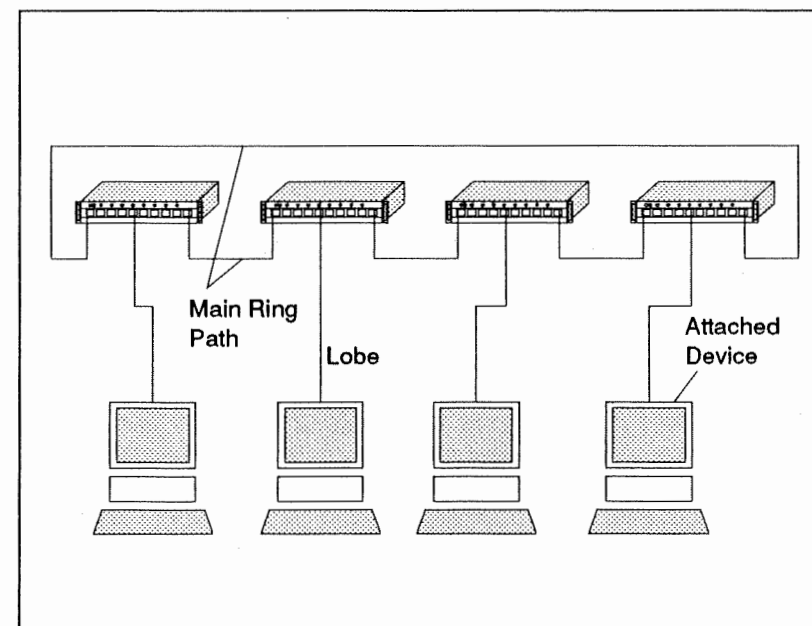

Fig 3.3 Network using several Multistation Access Units

3.1.4   Installation in a wiring closet

In larger installations with permanent wiring, the most flexible way to install the Multistation Access Unit is in a centrally placed wiring closet. This option allows you to attach and detach devices on the Token-Ring Network by merely moving a patch cable from one position on the distribution panel to another.

The Multistation Access Unit may be mounted in any standard 19" rack using the supplied screws.

Prepare and test the unit as outlined in chapter 2, PREPARING FOR OPERATION and install as follows:

1. Position the Multistation Access Unit approximately 1" (25 mm) underneath the lowest distibution panel and select appropriate square mounting holes.

2. Insert the square nut from the back of the rack so that the nut locks in position and secure the Multistation Access Unit with the supplied thumbscrew.

If you are using more than one Multistation Access Unit in the rack, install the additional units one below the other as outlined above, leaving no space between the units.

The Multistation Access Units may be interconnected with a patch cable using the RING-OUT and RING-IN connectors. See also section 3.1.3.

See final installation on figure 3.4.

NOTE: If you have very large installations, and need to distribute the required Multistation Access Units in more than one wiring closet, the Multistation Access Units in one rack may be connected to the Multistation Access Units in the next rack using patch cables. See the IBM Token-Ring Network Introduction and Planning Guide for details.
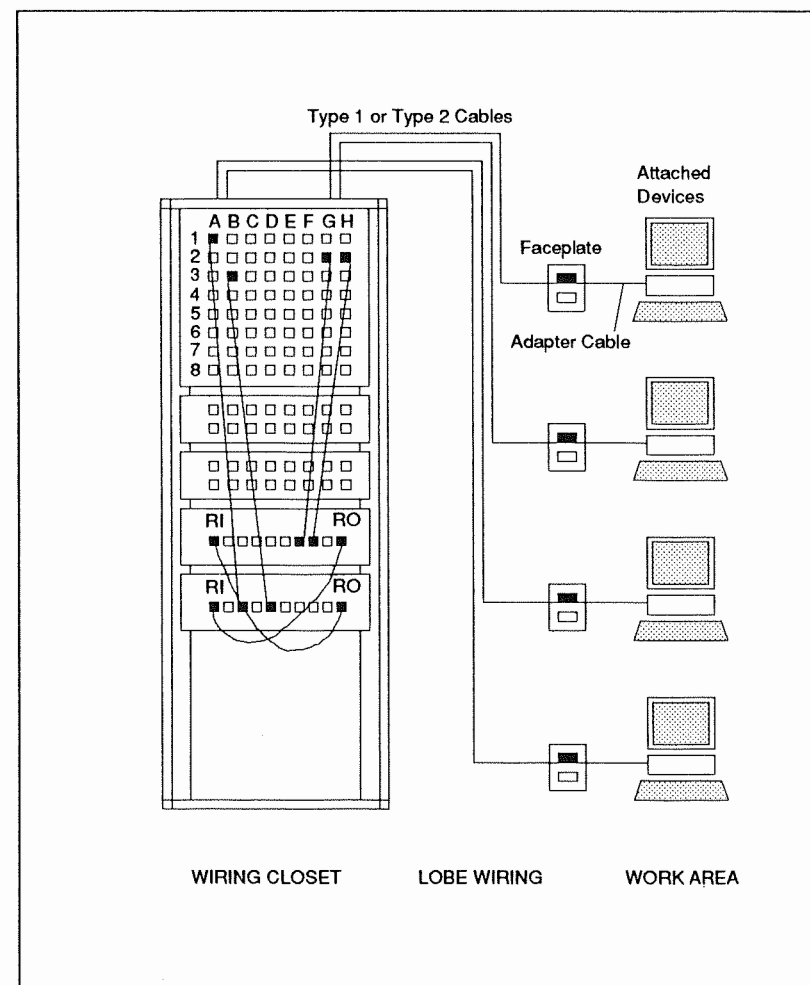
Fig 3.4   Installation in a wiring closet

4. LABELLING

4.1   USING LABELS

You should produce label sets to make it easy to identify the connections between your Multistation Access Unit and the connection points: one set of labels for labelling your Multistation Access Unit and one set of labels for devices attached to the Multistation Access Unit.

4.2   LABELLING THE UNIT

Once installed, label the Multistation Access Unit:

1.   Select a unique number from the Multistation Access Unit label set.

2.   Place one label in your inventory chart in the position corresponding to the physical position of the Multistation Access Unit.

3.   Place another identical label on the Multistation Access Unit in the upper righthand corner between station connector 8 and RING-OUT (RO). See figure 4.1.

Label

Fig 4.1 Labelling the Unit

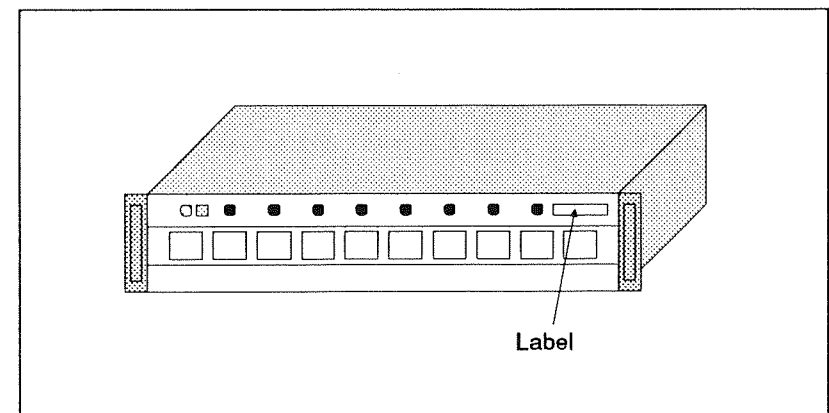4. Make sure to re-label or reposition the label in the inventory chart if you move the Multistation Access Unit.

4.3 LABELLING THE CONNECTION POINTS

To ease problem determination and repositioning of attached devices you can label each connection point using the set of labels for the attached devices. The set should contain a series of numbered labels, four identical labels for each device connection. The labels are used on:

1. The cabling planning charts.

2. The building wiring socket faceplate to be used for the device to be connected, or, if the Multistation Access Unit is used in a small, freestanding network, on the wall-mounted Multistation Access Unit housing.

3. The corresponding distribution panel connection point.

4.3.1 Wall-mounted Multistation Access Unit

If you are using a permanent, wall-mounted Multistation Access Unit in connection with permanent building wiring, you should label each Multistation Access Unit connection corresponding to the socket faceplate at the other end of the lobe.

To label the permanent wiring connections, do as follows:

1. Select a unique number from the set of labels for connection points.

2. Place one label in the indented space on the inside of the wall-mounted housing door above the appropriate station connector as shown in figure 4.2.
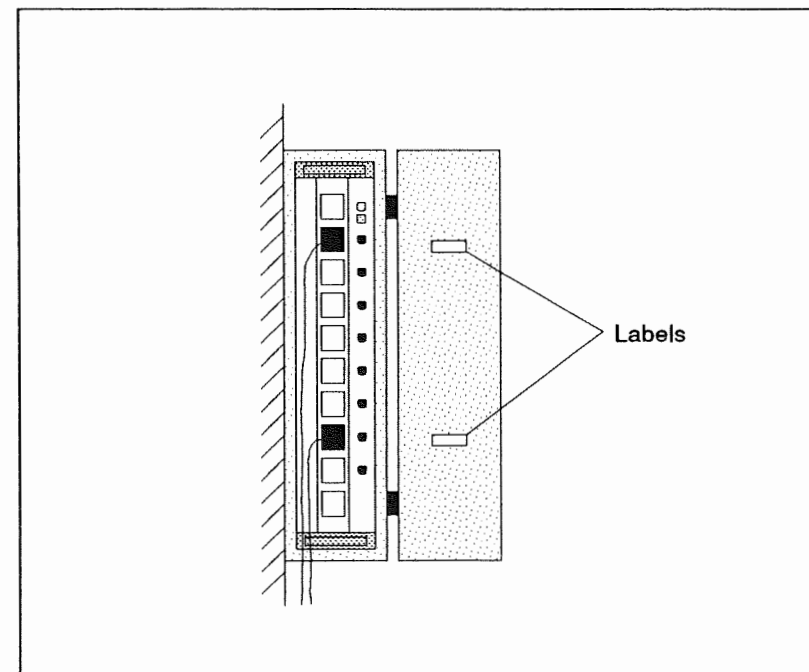
Fig 4.2 Labelling a wall-mounted housing

3. Place a second label in the indented space on the corresponding faceplate.

4. Discard any remaining labels with the identical number.

NOTE: Do not reposition the cables in the permanently installed Multistation Access Unit housing without replacing the labels BOTH on the Multistation Access Unit housing AND the corresponding faceplate.

4.3.2 Distribution panel

When the Multistation Access Unit is installed in a wiring closet, it is necessary to label the connection points on the distribution panel and the corresponding faceplates. Do as follows:

1.   Select a series of unique numbers to match the number of connection locations on the distribution panel from the set of connection point labels.

2.   Select a label from one of the sets of identical numbers and place it under the connection point on the panel. See figure 4.3.
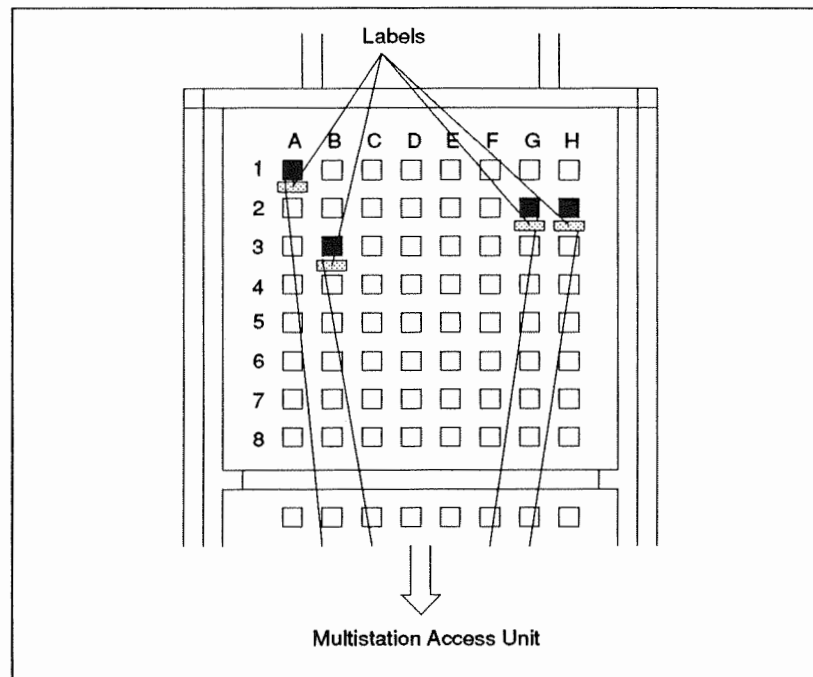

Fig 4.3 Labelling the distribution panel

3.   Place a second corresponding label in the indent of the corresponding faceplate.

4.   Place a third label in the appropriate location in your cable planning chart.

5.   Place a fourth label in the appropriate location in your wiring closet planning chart.

6.   Repeat steps 2 to 5 for the remaining set of connection points.

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5. FUNCTIONAL TESTS

5.1   STATION CONNECTOR TEST

5.1.1   Using the built-in reset/test function

Test the function of the eight station connectors of the Multistation Access Unit during normal operation as follows:

1.   Press the RESET button to check that the battery is operational. The yellow LED to the left of the reset button lights up if the battery is in working order.

2.   Check that the red LEDs above each station connector gradually increase in intensity, indicating that power is building up to switch the relays.

3.   The relays switch after about three seconds, and the red LEDs turn off.

4.   If any of the station connectors are occupied by active attached devices, the red LED will begin to light again. The corresponding relays switch again after approximately three seconds, and the red LED stays on, indicating normal, active device operation.

If the built-in reset/test function of the Multistation Access Unit indicates that all of the relays function, but the relays fail to switch when an attached device is active, proceed with the next section.

5.1.2   Using the IBM 8228 Setup Aid

To isolate a possible problem in the wiring from the attached device to the relays, first use the built-in reset function as described above.

If the built-in reset/test function switches the relays as indicated above, but does not function during normal operation, test each device connector using the IBM Setup Aid.

NOTE: The Setup Aid must not be connected to an active network for more that 10 seconds at a time. Otherwise, the network and attached devices will be disrupted.

1. Insert the IBM 8228 Setup Aid in the first station connector. Check:

    A. **On the Setup Aid:**

        The red LED is fully lit when the Setup Aid is initially inserted. The red LED will slowly dim over a period of approximately 4 seconds, then give a short flicker before turning off completely.

    B. **On the Multistation Access Unit:**

        The red LED above the station connector increases in intensity for approximately 4 seconds, then the relay switches with an audible click. The light turns off for a short time and then stays on, indicating active attached device (simulated by the Setup Aid).

2. With the Setup Aid still in place, press the RESET button on the Multistation Access Unit and check:

    A. **On the Multistation Access Unit:**

        All LEDs increase in intensity for a period of 4 seconds, flicker and then turn off. There should be two audible clicks when the relays are switched on and off. The LED above the station connector with the Setup Aid will turn off for a moment during the reset cycle, then light permanently.

3. Remove the Setup Aid from the station connector. Check that:

    A. **On the Multistation Access Unit:**

        The red LED turns off as the Setup Aid is removed, and an audible click is heard to indicate that the relay has switched.

4. Repeat steps 1 to 3 for the seven remaining station connectors.

5. Insert the Setup Aid in the RING-OUT (RO) connector and check that the red LED on the Setup Aid lights up.

6. With the Setup Aid still inserted in the RING-OUT connector, insert a cable with a MIC plug in the RING-IN (RI) connector (while the other end of the cable is left unconnected) and check that the red LED on the Setup Aid turns off.

If one or more of the above test does not give the results stated, contact your place of purchase.

5.2 CONNECTION PATH TEST

Perform a connection path test between the faceplate connector and the Multistation Access Unit station connectors by using the LED indications on the Multistation Access Unit and the IBM 8228 Setup Aid.

NOTE: The Setup Aid must not be connected to an active network for more that 10 seconds at a time. Otherwise, the network and attached devices will be disrupted.

1. Disconnect the attached device from the faceplate connector and plug in the Setup Aid instead.

2. The connection path between the faceplate connector and the Multistation Access Unit connector is in order if:

   A. On the Setup Aid:

   The LED turns on for at short moment. Immediately after the LED turns off and stays off.

   B. On the Multistation Access Unit:

   The red control LED above the attached station connector increases in intensity over four seconds, turns off for a short period, and then turns on permanently (the Setup Aid acts as an active device).

3. The connection path between the faceplate connector and the Multistation Access Unit connector is NOT in order if:

   A. On the Setup Aid:

   The LED turns on and stays on.

   B. On the Multistation Access Unit:

   The red control LED above the attached station connector stays off.

In larger installations the above procedure should be carried out by two persons. To check more than one station connector, it is advisable to work out a test sequence.

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6. SIMPLE FAULT DETERMINATION

The following symptoms may be used for a simple fault determination of your Multistation Access Unit:

SYMPTOM: The yellow LED is not fully lit, or lights dimly when pressing the RESET button.
CAUSE: The battery is not present or is used up.
ACTION: Replace the battery.

SYMPTOM: The red LED above a station connector fails to light during the reset cycle, but there is an audible click indicating that the relay switches.
CAUSE: The red LED is defective.
ACTION: Submit the Multistation Access Unit for service.

SYMPTOM: The red LED above a station connector lights during the reset cycle, but there is no audible click to indicate that the relay switches.
CAUSE: The relay is defective.
ACTION: Submit the Multistation Access Unit for service.

SYMPTOM: The red LED above the port is lit and there is an audible click during the reset cycle, but the attached unit fails to switch the relay during normal operation.
CAUSE: Wiring between attached device and the relay is faulty.
ACTION: Check the wiring from the attached device to the Multistation Access Unit. If no fault is found, submit the Multistation Access Unit for service.

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IMPORTANT!!

Before operation of this unit, take out the battery holder located on the rear panel of this cabinet, remove the insulating strip wrapped around the battery poles and reinsert the battery holder. Push the 'RESET' button on the front panel, and observe that the yellow LED is lit, and a reset cycle is performed.